

Flood Hazard Mitigation

A Plan for South Carolina

Annual Progress Report

December 2001

Flood Hazard Mitigation A Plan for South Carolina Annual Progress Report Contents

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Introduction

South Carolina's 4,000 square miles of floodplain have more than 150,000 households subject to flooding. Parts of the State have experienced some of the nation's worst flooding in recent years and parts have not been hit for many years. While the hazard and recent experience varies, floodplain managers agree that it's not *if* an area will flood, but *when*.

The sum total of flood damage on state agencies and the economy, even with Federal disaster assistance, reaches into the millions of dollars. One way to reduce this cost is through flood hazard mitigation.

To identify the most appropriate flood hazard mitigation measures for South Carolina, a Flood Hazard Mitigation Advisory Committee was created in 1998. The Committee included State, Federal and private agencies and organizations that implement mitigation programs or are stakeholders in floodplain development.

With staff support from the Department of Natural Resources' Flood Mitigation Office, the Committee drafted *Flood Hazard Mitigation: A Plan for South Carolina*. Copies of the full document can be downloaded from the DNR web site at www.dnr.state.sc.us.

On September 23, 1999, the Flood Hazard Mitigation Advisory Committee held its last meeting. The Committee put the finishing touches on *Flood Hazard Mitigation – A Plan for South Carolina* and recommended that it be adopted. The *Plan* was subsequently adopted as the state's flood mitigation plan when the State's mitigation plan was adopted by Executive Order of the Governor.

The last section of the document is the Action Plan. It identifies 44 action items that will implement the full flood mitigation plan. One of the action items called for the creation of a permanent Flood Mitigation Coordinating Committee. Another tasks the Committee with preparing an annual progress report on implementation of the *Flood Mitigation Plan*.

This document is that annual progress report for the year 2001. It was prepared under the direction of the Flood Mitigation Coordinating Committee. The information is current as of the Committee's annual progress review meeting which was held on December 3, 2001.

The Original Plan

Flood Hazard Mitigation: A Plan for South Carolina has six chapters. Chapter 1 introduces the plan and the planning committee. Chapter 2 provides an overview of the State's flood hazards. It summarizes five distinctive types of flooding in South Carolina:

- 1) Flash flooding – the primary hazard in the hilly terrain of the northwest and in cities with large areas of impervious surfaces.
- 2) Riverine flooding – these floods occur in the Piedmont and Coastal Plain areas which are subject to overbank flooding of rivers and streams.
- 3) Coastal storms and hurricanes – these bring very destructive flooding from storm surge, wave action and erosion. The concentration of people and development in the large exposed low country floodplains makes this the State's worst flood hazard.
- 4) Local drainage problems – these can occur anywhere in the State where the ground is flat, where the drainage pattern has been disrupted, or where channels or culverts have not been maintained.
- 5) Dam failure – these also can occur anywhere in the State where there is a dam.

The only readily available statistics on the State's exposure to flooding are based on the number of flood insurance policies. While not a basis for an accurate count of floodprone buildings, the number of flood insurance policies does represent where the hazards are and where the most properties are exposed. There are over 105,000 policies in South Carolina (the State ranks sixth in the nation).

The greatest concentration of policies is on the coast. The overwhelming majority of all policies (95.6%) are in the eight coastal counties. Nearly 90% of all policies (and therefore nearly 90% of the exposure) is in three counties: the coastal population centers of Charleston, Myrtle Beach and Hilton Head Island. The coastal counties also account for 99% of the State's repetitive flood insurance losses.

In Chapter 3. State Mitigation Goal and Objectives, there is one overall goal:

*Protect the people and property of South Carolina
from the dangers and damage caused by flooding.*

This is followed by a vision statement which calls for reserving undeveloped floodplains as natural areas or for low intensity development. Areas already urbanized would be protected from flood damage in accordance with comprehensive local mitigation plans. There are seven objectives to reach this goal and vision. These form the basis for the seven general themes of the Action Plan found in Chapter 6.

Chapter 4 reviews the variety of approaches to flood hazard mitigation. They are organized under six general strategies:

- 1) Prevention measures, such as planning, zoning, and building codes, which are designed to keep the problem from occurring or getting worse. They ensure that future development does not increase flood damage.
- 2) Property protection measures which modify buildings or other facilities to protect them from flood damage. They include acquisition, building elevation, floodproofing, and insurance.
- 3) Natural resource protection activities preserve or restore natural areas or the natural functions of floodplains, shorelines, wetlands and watersheds. They produce flood loss reduction benefits as well as improve water quality and habitats.
- 4) Emergency service measures protect people before, during and after a flood. They include early warning, response, and recovery during and after a flood.
- 5) Structural projects are used to prevent floodwaters from reaching properties. These measures involve construction of facilities to control water flows, such as dams, levees, channels and dunes.
- 6) Public information activities advise property owners, potential property owners and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of floodplains.

Chapter 5 reviews those State and Federal agencies and private organizations that can have a role in flood hazard mitigation. Most of them were represented on the South Carolina Flood Hazard Mitigation Advisory Committee. At the end of Chapter 5 is a matrix that matches these agencies with the mitigation strategies (from Chapter 4) that they are involved with.

Chapter 6's Action Plan has 44 recommendations to implement a variety of activities by State and Federal agencies. The recommendations are in the form of action items, organized under the seven general objectives that were identified as part of the goal setting. Each action item has lead and supporting agencies identified. All lead agencies are state agencies.

In the 2000 *Annual Progress Report* the original 44 action items were revised. Two were dropped because they were completed and two new ones were added. The resulting list is reviewed in the Action Items Status section later in this progress report.

Recent Floods

The *Flood Hazard Mitigation Plan* calls for the annual progress report to include a “review of any floods that occurred during the previous year.” The 2000 report discussed Hurricane Floyd and subsequent mitigation activities. However, 2001 was a particularly dry year and there were no floods to report on in this section.

Recent Mitigation Activities

[See the 2000 report for example language.

Lisa: This section needs to include a summary of any mitigation activities pursuant to Hurricane Floyd and any other activities of state significance. Examples include adoption of the State mitigation plan, handing out \$X for HMGP and FMA, etc.

The 2000 report says “More details will be available in the next report on the number of structures approved for buyout and elevation...”]

Action Items Status

With adoption of the *Plan*, the Flood Hazard Mitigation Advisory Committee became the Flood Mitigation Coordinating Committee. That Committee held its first meeting on August 11, 2000, to review the status of implementing the *Plan's* 44 action items.

This report summarizes the findings of that meeting. Each of the *Plan's* action items is followed by a short status report. This report follows the 7 general objectives, 6.1 - 6.7, that are used in the *Plan's* Chapter 6. Action Plan.

6.1. Coordinate State and Federal flood mitigation programs so they will operate more effectively and efficiently.

- 6.1.1. Establish a Flood Mitigation Coordinating Committee (FMCC). Membership would be open to all agencies that are listed as lead or supporting agencies for these action items. Other agencies and organizations would be invited to attend meetings. The Committee would be chaired by an appointee of the Director of the Department of Natural Resources. The Flood Mitigation Office would provide staff support to the Committee.

The Committee's primary duties would be to:

- A. Act as a forum to communicate the status of Federal, State and local flood hazard mitigation programs.
- B. Review conflicts between Federal, State and local plans and programs and recommend solutions.
- C. Set priorities and deadlines for the following action items
- D. Monitor implementation of this plan's recommendations, evaluate progress and make appropriate revisions.
- E. Review and improve the flood-related sections of the State Water Plan.
- F. Communicate and coordinate with the Hazard Mitigation Interagency Coordinating Committee and the Advisory Committee to the Building Codes Council.

Lead agency: LWC/DNR

Supporting agencies: All agencies and organizations listed in this *Plan*.

Status: Done. The Flood Mitigation Coordinating Committee was created with adoption of the *Plan*. This Action Item was revised in 2000 to read: "Conduct meetings of the Flood Mitigation Coordinating Committee (FMCC) at least once each quarter and a face to face meeting at least once each year. At each meeting the Committee should review the status of the priority action items. On the anniversary of the adoption of the Plan, the Committee should prepare a written status report on the action items in accordance with the format specified in Section 6.8 of the Plan."

Status of the revised action item: Ongoing. This report is the status report for 2001.

- 6.1.2. Encourage other organizations, such as land trusts, utility companies, and professional groups to participate in FMCC activities and encourage Committee members to participate in professional mitigation associations. (4.2.5)

Lead agency: FMCC
Supporting agency: LWC/DNR

Status: Several committee members are active in other groups. Member Daryle Fontenot is Chair of the South Carolina Association for Hazard Mitigation which is expanding its membership to include other organizations and is starting to work with the Municipal Association of South Carolina. LWC/DNR met with the Charleston Trident Association of Realtors® to discuss how to get real estate agents more educated in flood mitigation issues.

- 6.1.3. Clarify and simplify the flood mitigation responsibilities currently undertaken by the Department of Natural Resources, the Emergency Preparedness Division, and the Budget and Control Board. In 2000, this was designated as a priority item for 2001.

Lead agency: FMCC
Supporting agencies: LWC/DNR, EPD, Budget and Control Board

Status: The Budget and Control Board has a few funding responsibilities left over from Hurricane Hugo. Its mitigation role will soon be brought to a close. DNR and EPD spent a lot of time together coordinating flood mitigation activities after Hurricane Floyd. Their respective mitigation responsibilities have been worked out to the extent that things are working quite smoothly. No additional attention to this issue is needed. The two agencies recommend that this action item be dropped.

- 6.1.4. Establish a post-disaster mitigation coordinating mechanism. (4.4.6) The mechanism should:

- G. Ensure that State and Federal programs will encourage and support reconstruction and redevelopment activities that will reduce flood losses.
- H. Prepare/update a State flood recovery plan that identifies post-flood recovery and mitigation responsibilities and procedures that can quickly identify mitigation opportunities before people and communities rebuild.
- I. Be coordinated with action item 6.6.3.

In 2000, this was designated as a priority item for 2001.

Lead agency: FMCC
Supporting agencies: EPD, LWC/DNR

Status: As noted in Action Item 6.1.4, mitigation coordination during and after disasters has been improved, although not formalized. EPD and LWC/DNR recommend that these working procedures be used during the next major flood and evaluated. At that time, the agencies will determine whether additional mechanisms are needed.

- 6.1.5. Identify research needs and coordinate research activities to support mitigation programs.

Lead agency: FMCC
Supporting agencies: Sea Grant Consortium, USC Hazards Research Lab

Status: The USC Hazards Research Lab will be updating the state's risk assessment with the latest Census data. This will produce updated county profiles by the end of 2002.

LWC/DNR entered into a contract with the Hazards Research Lab to study local efforts to mitigate repetitive flood losses. The work plan is attached as Appendix A. Results are expected in a year.

The USGS is revising flood frequency equations for rural streams based on ten more years of gage data. New figures are expected in June 2002.

6.2. Provide flood data and maps to support mitigation programs.

See also action items 6.5.1, 6.5.2 and 6.5.3.

- 6.2.1. Establish a river gage priority system to identify where additional gages are most needed. (4.4.1, 4.6.1). In 2000, this was designated as a priority item for 2001.

Lead agency: LWC/DNR

Supporting agencies: USGS, NWS, State Hydrologist, SCDOT

Status: There is no priority listing yet. The 2000 *Annual Progress Report* identified a need for a gage for Black Creek in Florence and Darlington Counties. One has been established in Florence with Project Impact support. It could be converted to an NWS forecast point.

Developing a priority list for new gages is not as important as maintaining existing gages. During 2001, the state lost 21 federally funded gages. While the NWS forecast points are “secure,” loss of other gages reduces the reliability of flood data and flood mapping dependent on the data. Local cost-sharing can help keep gages from being removed by the owning federal agencies. The FMCC identified this as a priority item for 2002.

- 6.2.2. Evaluate the needs for Flood Insurance Rate Maps (FIRMs) and establish a mapping priority system. (4.6.1). This was completed in 2000 and dropped as an action item. A summary report was included in the 2000 *Annual Progress Report*.

- 6.2.3. Improve the process for revising FIRMs and ensure that they are updated when a State or Federal flood control project is completed. (4.6.1)

Lead agency: LWC/DNR

Supporting agency: FEMA

Status: Work on this action item was deferred because it was thought that FEMA was changing the rules for revising FIRMs based on flood control projects. However, that has proven to not be the case. There is a small FIRM restudy budget which has not funded a new map since 1999. It was recommended that LWC/DNR prepare a mapping priority list specifically for funding under the Hazard Mitigation Grant Program (HMGP). The application would be pre-positioned in EPD’s office so it could be used when the next disaster hits.

- 6.2.4. Complete the National Wetlands Inventory or other wetland identification maps for the balance of the State to facilitate wetland protection regulations. (4.3.1)

Lead agency: LWC/DNR

Supporting agencies: U.S. Fish & Wildlife Service, NRCS

Status: Most of the state has been mapped and DNR is putting the wetland maps into GIS digital format. The map to the right shows the digital coverage of the state to date. Additional mapping is dependent on federal funding, which is uncertain at this time. However, soils maps, which can be very helpful in identifying wetlands, have been completed for the entire state.

- 6.2.5. Survey in permanent elevation reference marks when bridges and other public facilities are replaced (4.6.1).

Lead agency: State Geodetic Survey

Supporting agencies: U.S. Geological Survey, U.S. Coast and Geodetic Survey, South Carolina Department of Transportation

Status: SCDOT reports that this is now standard language in all contracts for bridge work. This action item should be dropped as completed.

- 6.2.6 Record high water marks following each flood and prepare maps showing the area affected. This may require the installation of more crest gages. This is a new action item added in 2000.

Lead agency: LWC/DNR

Supporting agency: USGS

Status: There were no floods during the year.

6.3. Regulate future development to prevent increasing flood hazards and losses.

- 6.3.1. Review recent research findings and agency lessons learned and develop a master set of floodplain construction standards appropriate for State and local regulatory programs. (4.1.3, 4.1.4, 4.1.5, 4.3.3, 4.4.4). In 2000, this was designated as a priority item for 2001.

Lead agency: FMCC

Supporting agencies: all regulatory agencies

Status: No action has been taken yet, but DNR will be revising its model ordinance during the coming year. DNR is reviewing the new "No Adverse Impact" papers from the Association of State Floodplain Managers, which can provide guidance for regulatory language. Greenville County has adopted a new ordinance which also has some useful approaches. The FMCC identified this as a priority item for 2002.

- 6.3.2. Ensure that Federal programs comply with Executive Orders 11988 and 11990 on development in floodplains and wetlands. (4.1.4, 4.3.1, 4.3.2, 4.3.3, 4.5.1)

Lead agency: LWC/DNR

Supporting agencies: all Federal agencies

Status: It was hoped that there will be a new Federal Executive Order which will promote better coordination, but hopes have dimmed. DNR has been monitoring federal projects through the state clearinghouse.

- 6.3.3. Update the 1982 Governor's Executive Order on floodplain management in light of lessons learned and current State agency organization and responsibilities (4.1.4). The updated Order should address construction standards for State funded projects in communities not in the National Flood Insurance Program (4.1.3).

Lead agency: ~~FMCC~~ changed to LWC/DNR

Supporting agencies: All State agencies

Status: LWC/DNR is working on a revised state executive order. The FMCC identified this as a priority item for 2002.

- 6.3.4. Assist and encourage communities to adopt and enforce erosion and sediment control and stormwater management standards that address storms larger than the DHEC minimum water quality criteria for 2- and 10-year storms. (4.1.5, 4.3.2, 4.3.3)

Lead agency: Office of Environmental Quality Control, Department of Health & Environmental Control (DHEC)

Supporting agencies: LWC/DNR, NRCS, Environmental Protection Agency

Status: DHEC's Office of Environmental Quality Control staff encourages communities to address larger than the minimum state standards. Staff recommends communities to adopt their own programs that are meant to manage releases from larger storms. The expected 2003 NPDES rules should encourage many communities to improve their programs.

6.4. Protect existing development from flood damage.

- 6.4.1. Prepare a profile of the State's flood hazard exposure by assembling the following database. Update these databases over time to measure progress in reducing the State's exposure to flood damage. The database should be assembled as data can be collected, beginning with coastal and other high exposure areas.

J. An inventory of floodprone critical facilities (4.4.4)

Lead agency: EPD

Supporting agencies: All State agencies

Status: EPD has updated critical facility lists from the county emergency managers, but the lists need winnowing. Many sites that are not critical to the state are included. The hurricane program is also updating its list, which will cover the whole state.

K. An inventory of floodprone State-owned properties that are located in floodplains. This was completed in 2000 and dropped as an action item. Each agency will be sent the results for their properties.

L. State facilities appropriate for relocation or other mitigation action following a flood. (4.4.4, 4.4.6)

Lead agency: LWC/DNR

Supporting agencies: All State agencies

Status: It is recommended that this action item be deferred until after a flood or other disaster when mitigation funds would be made available. Meanwhile, all plans for improving or modifying state properties are reviewed by the State Engineer's office, which uses a checklist to identify appropriate mitigation actions that can be incorporated into the projects.

- 6.4.2. Ensure that all plans for structural flood control projects document consideration of the following. (4.5.1, 4.5.2, 4.5.3, 4.5.4)

- M. Nonstructural alternatives,
- N. The impact of all alternatives on flooding on other sites, and
- O. The impact of all alternatives on habitat and water quality

Lead agency: LWC/DNR

Supporting agencies: NRCS, U.S. Army Corps of Engineers

Status: No new NRCS or Corps of Engineers projects have been initiated in 2001. New Corps regulations require a floodplain management plan before a structural project can be funded. DNR reviews projects that are funded with disaster assistance grants to ensure that they follow the 8 step process. All Federally funded flood control plans must go through the State Clearinghouse, so they can be monitored.

- 6.4.3. Continue to ensure that all beach protection projects comply with the State's prohibition of seawalls and groins and that communities adopt dune and beach maintenance plans. (4.5.2, 4.5.6)

Lead agency: OCRM

Supporting agency: n/a

Status: Ongoing. All projects are checked and comply with the seawall and groin prohibition. All communities that use state funds have adopted dune and beach maintenance plans. Some of these are as much as 10 years old, but they are being updated.

- 6.4.4 Reduce the exposure of roads and bridges to damage and closure due to flooding, erosion and scouring. This is a new action item that was added in 2000.

Lead agency: SCDOT

Supporting agency: Federal Highway Administration

Status: This concern was raised because of damage caused by Hurricane Floyd. SCDOT is studying appropriate design standards and how to best incorporate them in projects.

6.5. Provide warning and emergency response activities to protect lives and property during a flood.

- 6.5.1. Expand the gauging system and IFLOWS implementation to extend the areas covered by real time data for flood threat recognition. (4.4.1). In 2000, this was designated as a priority item for 2001.

Lead agency: LWC/DNR

Supporting agencies: USGS, NWS, State Hydrologist

Status: The NWS has helped start an IFLOWS users group. IFLOWS is being replaced by “StormWatch.” The NWS has obtained 15 more gages and has installed them in Greenville, Anderson and Oconee Counties.

Further expansion of this program is limited by the gage’s distance from the NWS base. Repeater stations are needed if more counties want to participate. It is recommended that a priority list of gages and repeater stations be prepared for an HMGP application. The application would be pre-positioned in EPD’s office so it could be used when the next disaster hits.

- 6.5.2. Develop geographic information system technology and computer models to transfer precipitation forecasts and gage data to determine what areas will be flooded. In 2000, this was designated as a priority item for 2001.

Lead agency: LWC/DNR

Supporting agencies: NWS, USGS, State Hydrologist

Status: This was done by Horry County in real time during Hurricane Floyd. It is applicable only where there are good base maps. It should be promoted among local emergency and floodplain managers. An example from another state is shown below.

Such maps are only good where there is accurate topographic information. In the very flat coastal plains, this means one foot contour intervals. While it is estimated that 28 counties and all 10 councils of government have an in-house GIS capability, few have topographic base maps that are this accurate.

A demonstration on how this approach could work has been prepared by LWC/DNR. It is recommended that the demonstration be given at a future of the FMCC and then be used to help educate local emergency managers on what to ask their GIS offices for.

- 6.5.3. Prepare a booklet and/or web site that relates stream gage data to elevation data and the potential damage expected to result at various flood levels. Where feasible, the web site should also show real time and historical flood data. (4.4.2)

Lead agency: LWC/DNR

Supporting agencies: NWS, USGS, State Hydrologist

Status: More and more gages are on websites now and more have elevation data, stage data, and information on what gets flooded at various stages. The FMCC identified this as a priority item for 2002.

- 6.5.4. Prominently locate a uniform system of staff gages on all highway underpasses subject to flooding to warn drivers of the depth of the water. Publicize the dangers of driving on a flooded road. (4.4.2)

Lead agency: South Carolina Department of Transportation

Supporting agency: NWS

Status: SCDOT understands the benefits of the gages, but has not taken any formal action yet.

- 6.5.5. Assist and encourage communities to develop and implement site-specific gage data and flood warning and response plans (4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5). In 2000, this was designated as a priority item for 2001.

Lead agency: EPD

Supporting agencies: State Hydrologist, LWC/DNR, NWS, OCRM

Status: Some communities, like Hilton Head Island, have prepared flood-specific warning and response plans. They should be reviewed to see if they would make good models for other communities.

There will be more ways to support communities interested in preparing these plans. The LWC/DNR flood stage forecast map demonstration would make a good training aid for local officials (see action item 6.5.2). EPD and NWS are implementing programs that are making real time weather and river data more accessible to more emergency managers.

- 6.5.6. Provide model documents for local reproduction on flood warnings, flood safety and evacuation procedures. Coastal materials should be oriented to tourists. (4.4.1, 4.4.2, 4.4.3, 4.4.5, 4.6.2)

Lead agency: EPD

Supporting agencies: LWC/DNR, OCRM

Status: There is presently no formal site or clearinghouse of good examples. EPD, the Community Rating System and Project Impact staff have collections. EPD's hurricane guide is published in more than 50 newspapers each year, but there is no similar program for inland flooding. An example from Florence's web site is on the next page.

There should be a repository for local materials whose contents should be reviewed so good examples can be disseminated. The FMCC identified this as a priority item for 2002.

- 6.5.7. Provide information and model plans to guide owners and managers of floodprone facilities in developing their own site-specific flood response plans. (4.4.4)

Lead agency: EPD

Supporting agency: N/A

Status: No action yet. EPD will search for local examples. It would help to have good reporting gages and base maps first, as recommended in action items 6.5.1 and 6.5.2.

6.6. Support and improve local mitigation programs.

- 6.6.1. Identify Federal, State and private post-disaster funding programs and determine how they can support mitigation activities. (4.4.6)

Lead agency: FMCC changed to Hazard Mitigation Interagency Coordinating Committee

Supporting agency: LWC/DNR, EPD

Status: There were briefings on the Hazard Mitigation Grant Program after Hurricane Floyd. The Inter-agency Coordinating Committee (ICC) staff members meet at least annually and after every disaster declaration and review funding opportunities. Applications for funding can be filled out in advance to facilitate speedy processing after the declaration.

- 6.6.2. Assist and encourage the natural resources elements of local comprehensive plans to address all natural hazards. Land use plans and zoning ordinances should show known flood problem areas and identify land uses appropriate for the hazard. (4.1.1)

Lead agency: South Carolina Chapter, American Planning Association

Supporting agency: LWC/DNR

Status: The South Carolina Chapter has discussed the issue and agrees it should be pursued. Chapter members have devoted their attention to more pressing matters, especially pending takings legislation. They welcome more information from state agencies on the topic.

- 6.6.3. Assist and encourage communities to develop and implement pre-disaster mitigation plans that identify sites appropriate for redevelopment, acquisition, relocation, elevation and floodproofing projects and that establish post-disaster mitigation procedures. (4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.3.6) See also action item 6.1.4. This should be done with training programs, reference materials, and technical assistance. In 2000, this was designated as a priority item for 2001.

Lead agency: LWC/DNR, EPD

Supporting agencies: FEMA

Status: No action yet. There some good mitigation plans from Charleston, Florence, Beaufort County, Greenville, Conway and Hilton Head Island that should be reviewed and, if appropriate, shared with other communities. Hilton Head Island has post-disaster mitigation procedures, too.

Under new rules pursuant the Disaster Mitigation Act of 2000, all communities will need a mitigation plan to be eligible for funding under the Hazard Mitigation Grant Program. None of the current plans have a comprehensive multi-hazard risk assessment, which will be needed to meet DMA requirements.

EPD plans to develop a model mitigation plan and conduct training for local officials. The topic will also be reviewed at the state hurricane conference in March and the emergency managers conference in October.

- 6.6.4. Assist and encourage communities to adopt and enforce the floodplain regulation provisions of the Standard Building Code and those more restrictive construction standards appropriate for local flooding conditions. (4.1.3). In 2000, this was designated as a priority item for 2001.

Lead agency: Building Codes Council, Department of Insurance

Supporting agency: LWC/DNR

Status: The State adopted the International Codes since the *Plan* was adopted. This replaces the Standard Building Code. Greenville wanted to adopt a more restrictive floodplain standard (that is credited by the Community Rating System), but it is not clear whether a community can adopt

standards that are different from the new Code. Communities need to submit individual requests to the Building Codes Council to obtain a waiver to enforce more restrictive local standards.

All communities with building codes have adopted the International Building Code. They have until July 2002 to adopt the International Residential Code or enter into an interagency agreement with a code enforcement office.

It is recommended that the Council issue a blanket approval of the more common provisions that communities adopt for better local floodplain management and/or CRS credit.

6.6.5. Improve local capabilities for managing floodplain development.

- P. Assist and encourage all communities to join the National Flood Insurance Program. (4.1.3)
- Q. Provide new training opportunities for local permit officials (4.1.3)
- R. Implement a floodplain manager certification program to encourage local permit officials to become more proficient. (4.1.3)
- S. Expand LWC/DNR and FEMA reviews of local regulatory programs to include more communities each year. (4.1.3)
- T. Add to all State and Federal permits a reminder that the applicant may need a local floodplain construction permit. 4.1.5, 4.3.1, 4.3.2, 4.3.3)

Lead agency: LWC/DNR

Supporting agencies: FEMA, Federal and State regulating agencies

Status: A. Underway. One more community joined the NFIP in 2001.

B. Underway. DNR conducted:

- The five day “Floodplain Management 101” course,
- Four workshops on the new FEMA Elevation Certificate, and
- The field deployed two-day coastal construction course.
- Charleston County will host a pilot ½ day version of the coastal construction course in January 2002.

C. The national certification program has been started and its exam is given several times each year. There are currently 30 Certified Floodplain Managers in South Carolina.

D. Four Community Assistance Visits and 8 other contacts were conducted during the year, but FEMA and state resources were stretched.

E. The requirement for local permits should be in the proposed state executive order.

6.6.6. Collate and distribute information to communities on open space programs and financial assistance for preserving open space. (4.1.2)

Lead agency: LWC/DNR

Supporting agency: NRCS

Status:

6.6.7. Improve local drainage system maintenance.

- U. Assist and encourage communities to develop and implement formal maintenance programs. (4.5.5, 4.5.6)
- V. Provide local governments with clear statutory authority to enter all properties, public and private, within or outside their corporate limits, to remove obstructions or debris that can increase the flood hazard to other properties. (4.5.5)

Lead agency: LWC/DNR

Supporting agency: N/A

Status: A. The Community Rating System and NPDES encourage formal maintenance programs.
B. More research is needed on local statutory authority.

- 6.6.8. Assist and encourage NFIP communities to join the Community Rating System. (4.1.2, 4.1.3, 4.1.4, 4.1.5, 4.2.6, 4.3.2, 4.4.1, 4.4.2, 4.4.2, 4.4.4, 4.5.5, 4.5.6, 4.6.1, 4.6.2, 4.6.3, 4.6.4, 4.6.5)

Lead agency: LWC/DNR

Supporting agency: FEMA

Status: Florence, Florence County, North Charleston and Georgetown County are reported to be considering applying. LWC/DNR has been helping these communities. The CRS is promoted at the annual meetings of SCAHM.

6.7. Provide flood protection information to property owners.

- 6.7.1. Assist and encourage communities to develop and implement locally appropriate public information programs (4.6.1, 4.6.2, 4.6.3, 4.6.4, 4.6.5, 4.6.6).

W. Develop a directory of State and Federal agencies that can provide technical backup to local public information programs (4.6.1, 4.6.5, 4.6.6).

X. Develop and distribute a directory of State and Federal publications that are appropriate for libraries interested in materials that can help their floodprone customers. (4.6.4, 4.6.6)

Lead agency: LWC/DNR

Supporting agencies: EPD, FEMA

Status: No action yet. This should be coordinated with action item 6.5.6 (model flood warning documents for the public). The FMCC identified this as a priority item for 2002.

- 6.7.2. Provide information and technical assistance to property owners.

Y. Provide information on methods to protect their properties from flooding. (4.2.3, 4.2.4, 2.6, 4.6.2, 4.6.5)

Z. Provide information on flood insurance. (4.2.6, 4.6.2) Provide guidance materials on best management practices (BMPs) (4.3.3, 4.6.6)

AA. Review the educational efforts of State and Federal agencies for opportunities to include materials on flood protection. (4.6.2, 4.6.6)

See also action item 6.5.7.

Lead agency: LWC/DNR

Supporting agencies: EPD, FEMA, NRCS, Department of Health and Environmental Control

Status: DNR provides ongoing advice and assistance to property owners. This should be coordinated with action item 6.7.1 (encourage local public information programs). DNR has a traveling exhibit which has been displayed at conferences and meetings of various organizations (see photo).

- 6.7.3. Work with the Department of Education and local schools to incorporate flood issues in elementary and high school curriculums. (4.6.2, 4.6.6)

Lead agency: LWC/DNR

Supporting agency: Department of Education, Sea Grant Consortium, University of South Carolina Hazards Research Lab, Natural Resources Conservation Service, soil and water conservation districts

Status: The Department of Education is adopting an extensive set of state standards for local curricula. It begins in kindergarten with basic concepts of the water cycle and water conservation and goes through 10th grade. Topics include flooding, severe weather safety, land forms, identifying drainage divides, and “living in areas with natural hazards.”

The Sea Grant program runs several education programs, including “marine educators” and the retrofitted historical building at 113 Calhoun Street in Charleston.

- 6.7.4. Improve the information provided to potential purchasers of floodprone property through statutory or regulatory requirements that:

BB. Mandate disclosure of whether a property is in a FEMA mapped Special Flood Hazard Area at the time of the agreement to purchase, such as a notice in the Multiple Listing Service (4.6.3)

CC. Require that lot surveys must identify whether a portion of the lot is in a FEMA mapped Special Flood Hazard Area (4.6.3)

Lead agency: FMCC

Supporting agency: Department of Labor, Licensing & Regulation

Status: LWC/DNR met with the Charleston Trident Association of Realtors® to discuss how to get real estate agents more educated in flood mitigation issues. DNR is also considering language for lot surveys in the model ordinance that it is working on.

- 6.7.5. Increase insurance agents’ knowledge of and interest in selling flood insurance. (4.2.6)

Lead agency: Department of Insurance

Supporting agencies: LWC/DNR, FEMA

Status: The National Flood Insurance Program has conducted workshops on insurance, lenders’ obligations, the new FEMA Elevation Certificate and Increased Cost of Compliance. Other training programs addressed claims and dealing with “catastrophic losses.” Flood insurance is included in the three hurricane expos that are conducted along the coast each year.

6.7.6. Work with organizations of farmers, businesses and advisors to businesses (e.g., the Association of Contingency Planners) to increase their members' knowledge of and interest in natural hazard mitigation. (4.3.3, 4.6.2) See also action item 6.1.2

Lead agency: FMCC

Supporting agency: EPD

Status: No action yet.

Appendix A

Assessing Repetitive Flood Losses in South Carolina

A Proposed Scope of Work
Submitted to the
Flood Mitigation Program
Land, Water, & Conservation Division
South Carolina Department of Natural Resources

By
Susan L. Cutter
Director, Hazards Research Lab
Department of Geography
University of South Carolina

September 6, 2001

Synopsis

In the past twenty years, there were more than 1,100 known flood events including urban flooding, flash flooding, and riverine floods that resulted in approximately 21,400 claims for assistance. Between 1978-1997, more than \$381 million was paid out to South Carolina residents from the flood insurance program (Cutter et al. 1999). Another indicator of the flood risk is the number of flood insurance policies, which totaled around 105,000 in 1998 (DNR 1999). The overwhelming majority of these policies (95%) are located in the coastal counties, with 96% of the repetitive loss properties located in these same counties. There are currently 199 South Carolina communities participating in the National Flood Insurance Program. Of these, 47 are designated repetitive loss communities because they contain properties with flood insurance policies, which had two or more claims (greater than \$1,000 each) during the last 10 years. This scope of work is to characterize the 199 communities participating in the National Flood Insurance Program and to assess those factors that facilitate or impede the reduction of repetitive flood losses in the state.

Work Plan

We propose the following tasks in producing the assessment. We will work closely with the State Coordinator of the Flood Mitigation Program as the primary contact person.

6.1.1. Task 1. Descriptive Analysis of Communities

A socio-demographic profile of all the NFIP communities will be established to measure any significant differences between those designated as repetitive loss (N=47) and those that are not (N=152). Hazard-related data will be included as well such as the number of flood events during the past ten years, flood losses and claims, number of NFIP policies per community, number of NFIP policies retained since the last Presidential Disaster Declaration (Hurricane Floyd in 1999). Historical information (demographic changes during the 1990s, date of entry into the NFIP program) will also be included where appropriate. Statistically significant differences between the two groups of communities (those with repetitive losses, those without) on any of the demographic, hazard, or historical data will be highlighted.

6.1.2. Task 2. Typology of communities based on their success in reducing flood losses

A matrix will be developed to determine community performance on a number of criteria related to reducing flood losses and then the communities will be ranked according to the criteria into three categories: 1) those that do it well and beyond the minimum standards required by the NFIP; 2) those that minimally achieve some flood reduction; and 3) those communities that do not meet the minimum criteria for reducing flood losses. Criteria will be derived from the State Flood Hazard Mitigation Plan and in consultation with the State Coordinator of the Flood Mitigation Program. A partial listing is provided below and in Table 1:

- a. mapping of floodplains and flood hazard areas
- b. review NFIP compliance and local floodplain ordinances (meet, exceed, or not meet)
- c. land use in flood-prone areas (open space, high density development, etc.)
- d. building codes and enforcement (presence of local ordinances, # inspections, # of violations)
- e. compliance with state regulatory programs (% NPDES, # enforcement actions)
- f. compliance with Community Rating System activities (e.g. # libraries with flood hazard information)
- g. adequacy of comprehensive plans (e.g. inclusion of flood hazards and floodplains)
- h. recognition of development pressures and inclusion in master plan
- i. growth rate (current and anticipated)

6.1.3. Task 3. Evaluation of federal programs affecting South Carolina

A qualitative evaluation of federal programs (and state implementation) that potentially enhance or inhibit repetitive losses to flooding will be examined. Again using a matrix methodology, each federal program will be examined for its impact and/or influence on South Carolina. Those programs to be evaluated include the following:

State Agencies/Programs

State Geodetic Survey (mapping and elevation reference markers)
EPD Hazard Mitigation Grant Program, Project Impact
Department of Commerce (Community Development Block Grants)
DHEC (dams, dredging, stormwater management, NPDES, mining, solid waste, hazardous waste, wetland filling, etc.)
Department of Insurance (Loss Mitigation Grant Program)
Department of Labor, Licensing & Regulations (building code standards, placement of manufactured housing)
Department of Natural Resources (State Hydrologist, Flood Mitigation Office, State Climatologist, Conservation Districts, Non-point source programs)
Department of Transportation

Federal Agencies/Programs

U.S. Army Corps of Engineers (floodplain management, 404 wetland permits, Section 10 permits for construction in navigable waters)
USDA, Natural Resources Conservation Service (conservation reserve program, emergency watershed program)
USGS (flood hydrology, stream gauging, watershed programs)
Fish and Wildlife Service (COBRA review, wetland mapping)
FEMA (Hazard Mitigation Grant Program, Flood Mitigation Assistance, Community Rating System, Increased Cost of Compliance)
NOAA (flood forecasts, warnings)
Federal Highway Administration (new road construction)

References

Cutter, S.L. et al., 1999. *South Carolina Atlas of Environmental Risks and Hazards*. Columbia: University of South Carolina Press.

The Hazard Mitigation Technical Assistance Partnership Inc., 1999. *South Carolina Flood Mitigation Plan*. Columbia: Land, Water and Conservation Division, South Carolina Department of Natural Resources

Deliverables

At the conclusion of the project, a written report and analysis (hard copy and digital) of those factors contributing to either reducing losses or increasing them will be produced along with some recommendations for policy changes and future information needs. We will also provide a digital copy of the data set compiled for the evaluation. Both the written report and a copy of the data set will be given to the South Carolina Department of Natural Resources.

Funding Period: October 1, 2001 to September 30, 2002 (12 months)

Sample Partial Evaluation Matrix for the Community Assessment

Community: *Flamingo Beach*

6.2.Evaluation

Criteria	Exceeds	Meets	Does Not Meet
Comprehensive Plan with natural resources element (include floodplain information)	✓		
Zoning, land use maps include floodplains, coastal barriers, 100 year and 500 year floodplains		✓	
Regulations prohibit development in floodplains		✓	
Open space preservation of floodplains		✓	
Flood protection standards included into building codes			✓
NFIP compliance—permit for development in floodplain		✓	
NFIP compliance—ordinances prohibit development in floodway			✓
NFIP compliance—ordinances require elevation of lowest floors above base flood (residential and non-residential)		✓	
NFIP compliance—ordinances on substantial improvements and floodproofing			✓
NFIP compliance—new buildings and substantial improvements in coastal high hazard areas elevated on open columns		✓	
Enforcement of NFIP compliance			✓
State owned facilities in floodplains (# and % of total)			✓
TOTAL	1	5	6